# Temple SCTC 2100: Modeling & Simulation in Science and Technology
## Spring 2018
## Course Syllabus

**Course:** SCTC 2100.001.

**Course Title:** Topics in Science and Technology: Modeling and Simulation in Science and Technology.

**Time:** TR 3:30-4:50.

**Place:** SERC 456.

**Instructor:** Benjamin Seibold.

**Instructor Office:** Wachman 518.

**Instructor Email:** `seibold@temple.edu`

**Instructor Phone:** 215-204-1656.

**Course Web Page:** `https://www.math.temple.edu/ seibold/teaching/2018_2100`

**Office Hours:** T 1:00-2:00, R 2:00-3:20.

**Prerequisites:** MATH 1042 or equivalent.

**Textbook:** There is no single textbook for this course. The materials come from a variety of books and other sources. See course web page for suggested additional reading.

**Course Goals:** Expose students to the process of model building, the simulation and computation with mathematical models, and the interpretation and analysis of simulation results. Moreover, students will experience fundamental concepts ubiquitous in science and technology, such as: instabilities, phase transitions, resonance, upscaling.

**Topics Covered:** This course introduces the concept of (a) building a mathematical model of a real-world process, (b) using computational resources to simulate the model, and (c) properly interpreting the results. The main focus lies on processes with many interacting agents, such as: traffic flow, spread of diseases, forest fires, animal swarming, economic markets, social networks, robotics. The course provides an overview of model building concepts, training on the implementation of models in a computing environment, as well as theoretical background on how to analyze and understand large-scale phenomena (traffic waves, stock market crashes, swarm intelligence, etc.). General interest in mathematical model building and in programming is required.

**Course Grading:** Homework problems sets: 30%; course project: 30%; exams: 40%.

**Exam Dates:** Project presentations on 04/26/2018. Final exam on 05/03/2018.

**Attendance Policy:** Students are expected to attend every class. If a student cannot attend a class for some justifiable reason, he or she is expected to contact the instructor before class.

Any student who has a need for accommodation based on the impact of a disability should contact me the course instructor. Contact Disability Resources and Services at (215) 204-1280, 100 Ritter Annex, to coordinate reasonable accommodations for students with documented disabilities.

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02) which

can be accessed here.

Students will be charged for a course unless dropped by the Drop/Add deadline date. Check the University calendar for exact dates.

During the Drop/Add period, students may drop a course with no record of the class appearing on their transcript. Students are not financially responsible for any courses dropped during this period. In the following weeks prior to or on the withdrawal date students may withdraw from a course with the grade of "W" appearing on their transcript. After the withdrawal date students may not withdraw from courses. Check the University Calendar for exact dates.

The grade "I" (an "incomplete") is only given if students cannot complete the course work due to circumstances beyond their control. It is necessary for the student to have completed the majority of the course work with a passing average and to sign an incomplete contract which clearly states what is left for the student to do and the deadline by which the work must be completed. The incomplete contract must also include a default grade that will be used in case the "I" grade is not resolved by the agreed deadline.